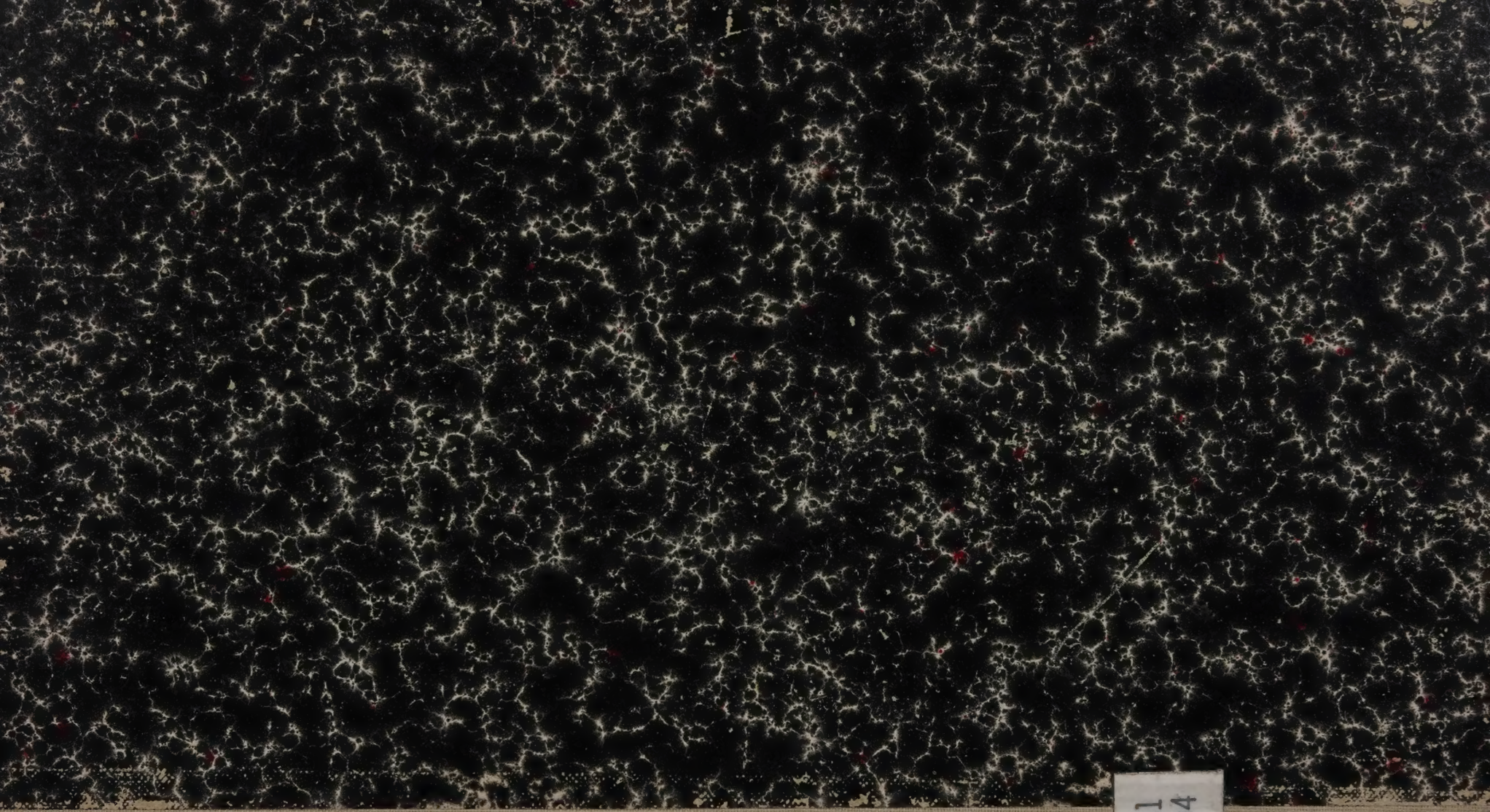

Whittlesey Great Seam Coal Regio Ohio

BACCONY
OHIO

GREAT SEAM COAL REGION, OHIO.

COMPARISON OF STRATA.

BY COLONEL CHARLES WHITTLESEY.

The profile I published a short time since extending from the valley of Little Monday creek, near Maxville, through Straitsville to the valley of Snow Fork, was on the line of dip south seventy degrees east, and therefore across the stratification. It was ten (10) miles in length, exhibiting a breadth of outcrop of the beds ten miles wide, and a thickness of the strata of about 350 feet, rising from the Maxville to the Cambridge limestone. In this space there is known to be seven (7) beds of iron ore, four of coal, and in places six (6) of limestone.

The two profiles of Mr. James Nichols, M. E., which, through the courtesy of Colonel Riley, I was enabled to examine, are made, one through Moxahala due south into the valley of Sunday creek, passing Buckingham and thence along the divide between the waters of Snow Fork and Sunday creek, in Trimble township, Athens county, to Salina, on the Hocking river, a distance of 20 miles. His other profile is at right angles to this, or east and west, extending from the valley of Sunday creek, across Snow Fork and Monday creek, to the dividing ridge between this creek and the Hocking river. It follows the line between the second and third tier of sections, from the south line of Trimble, Ward and Green townships. Both of these profiles are oblique to the *dip* and to the *bearing* of the strata. Having been made with much care, by the use of an engineer's level, they give us, for the first time in this region, an exact physical profile.

No survey of a mineral district can be considered complete until such profiles are made at intervals of a few miles apart, the direction of which should be on the line of dip, and on the line of bearing. We thus get a continuous series of local profiles from valley to valley and from hill to hill, in which at least the elevations, and therefore the inclination of the beds, are forever fixed. Without a party of men to uncover the beds, it is not possible for a mining engineer to find all the outcrops, and to assert that the strata are fully developed; but he has in this way laid the foundation for subsequent explorers to work upon, which is perpetual.

In this paper I have grouped a series of four local sections on the *line of bearing* or *strike*, which is about north 20 degrees east, but curves to the east in going north, beginning on the south near Carbon Hill, passing near Straitsville, but a little east, near Shawnee and a mile west of Moxahala, a distance of fifteen (15) miles.

The remarkable regularity of the Great seam appears from the uniform elevation of its outcrop at the four places referred to. On the west side of the valley of Monday creek, by Mr. Nichols's profile, its elevation above Lake Erie is 270 feet, on the heads of Middle Fork, 265, 259 and 275; at Shawnee 275 to 287; between Moxahala and the Koons tunnel, 260 to 275; seven miles further in the same general direction along the strike, near McLuney's station, 260 to 275. These figures refer to the bottom of the beds, in all cases, and are as near correct as can be expected without a series of levels made for the purpose. The engineers of the railways pointing to this region, have given me every facility in procuring levels, especial-

SECTION NO. 1.—NEAR MOXAHALA.

Vertical scale 40 ft. to the inch.

SECTION NO. 2.—NEAR SHAWNEE.

SECTION NO. 3.—NEAR STRAITSVILLE.

Yellow Shale.

Ore.
Limestone.

Shale.

Ore.

Sandstone.

Limestone.

Ore.
Limestone.
Bayley's run coal, 340 ft. A.

Ore.

Sandstone.

Norris coal.

L. Stone.

Ore.
Buff L. Stone,

Great Seam coal, full thickness, 265 ft. A.

Ore.

Sandstone.

Lower Coal.

Ore.

Shale.

200 ft. above Lake Erie.

SECTION NO. 4.—NEAR CARBON HILL.

Ore.
Coal.

S. Stone.

Ore.
L. Stone.

Shale.

Ore.
L. Stone.

Shale.

Ore.
Bayley's run coal, 360 ft. A.

S. Stone.

Ore.

Ore.
Norris coal, 325 ft. A.

Ore.

Ore.

Shale,

Ore.

Great Seam, 7 ft. thick, 270 ft. above Lake Erie

Ore.

Lower coal.

Ore.

Shale.

200 ft. above Lake Erie.

ly J. W. Riley, Wm. H. Jennings, Carey Wilson, George S. Lester and M. A. Mansfield. There are certain doubts and discrepancies about some of the zeros when referred to Lake Erie; but these are reduced to small limits. I will give more of the elevations further on.

This group of profiles represents the full breadth of the Great seam area, from its southerly edge, where the coal is seven feet, to its northerly, where it is six feet, passing through the maximum of ten and eleven feet. For details of thickness see Professor Andrews in Geological Report of 1869–70, pages 97 to 103.

As I have said before, this bed of coal is the only stratum that is found *everywhere in its place.* All others, whether of coal, ore or limestone, are in places wanting. It follows, therefore, that we can not count absolutely upon a continuance of these beds, though beneath every divide, from valley to valley. The two outside sections, Nos. 1 and 4, near Carbon Hill and Moxahala, are substantially those of Mr. Nichols, and are at the extremities of his two profiles. In some cases the actual observed points are somewhat one side of the direct line, because the strata are frequently concealed, where the explorer is most desirous to see them.

LEVELS SHOWING THE DESCENT OF THE GREAT SEAM ON LINES CROSSING THE STRIKE NEARLY AT RIGHT ANGLES THROUGH THE SEVERAL PROFILES.

1. *New Lexington to Moxahala.*

(Course southeasterly—distance five miles.)

Onehalf mile south of N. Lexington	360	A. L. E.
Sec. 15. Pike township, near Koons tunnel	335	"
Sec. 23, Pike township	285	"
Sec. 25, Pike township	265	"
Sec. 30, Pleasant tp., near Moxahala	255	"

2. *Bristol to Buckingham.*

(Course southeast - distance eight miles.)

Bristol tunnel	390	A. L. E.
McCunesville	345	"
Northwest quarter section 16, near Shawnee	311	"
Shawnee	275 to 287	"
Sec. 23, Salt Lick township	246	"
Buckingham	175	"
Sec. 26. Monroe township	142	"

3. *Monday Creek to Snow Fork.*

(Course southeasterly—distance nine miles.)

Sec. 24, Monday Creek township	335	A. L. E.
Sec 19, Salt Lick township	320	"
Straitsville Mining Co	287	"
Sec. 33, Middle Fork	270	"
Sec. 12, Snow Fork, Ward tp., about	206	"

4. *Haydensville to Snow Fork.*

(Course nearly east—distance eight miles.)

Sec. 1, Green township	317	A. L. E.
Sec. 32, Monday Creek, near Carbon Hill	270	"
Sec. 14, Ward tp., Poplar run	205	"
Sec. 2, Ward tp., Snow Fork	129	"

GENERAL ELEVATIONS OF THE GREAT SEAM.

McLuney's Station	263	A. L. E.
Tunnel four miles southwest, 24 feet below grade	338	"
Near New Lexington	360	"
Moxahala	255	"
Koons tunnel, three miles southeast of New Lexington	330	"
Bristol tunnel, north end	386	"
McCune's salt works	345	"
Newark Coal Co., Shawnee	287	"
Buckingham	185	"
Sunday Creek, on Athens county line.	76	"
Wright's bank, one mile west of Straitsville	335	"
County line, sec. 32, Salt Lick	284	"
Hayden's mine, sec 1, Green tp.	317	"
Sec. 24, Lost run, Ward tp.	265	"
Head of Michael's run, Ward tp.	250	"
Heads of Poplar run, Ward tp	206	"
Sec. 19, Brooks's mine, Ward tp.	213	"
Heads of Lick run, York township, Athens county	238	"
One mile below Nelsonville, Athens county	138	"
Snow Fork at county line	126	"
Sunday Creek at Ewing, Athens Co.	75	"
Salina, mouth of Sunday creek, Athens county	15	B. L. E.

For the principal part of these levels I am indebted to Mr. Jennings, Chief Engineer of the Hocking Valley railroad, and to his maps of this region.

These sections represent geological columns several miles asunder, on or near the line of bearing along which the strata theoretically are level. Looking southeasterly in the direction of the dip, the left hand column, or No. 1, gives a reasonable good exhibit of the beds near Moxahala, within a mile to the northwest. The Great seam is here the Upper New Lexington, the one next below the Lower New Lexington, and they are about the same thickness. They extend beneath the Koons tunnel three miles to the northwest, beneath the Bristol tunnel, six (6) miles to the west, through the country east of New Lexington, and beneath the tunnel three miles northeast of that place, into the valley of Jonathan's creek, where both of them are worked.

From Moxahala they extend down the valley on both sides, to its mouth near McLuney's station, and thence to Zanesville. For the two coal seams next above these, I use the names given them by Professor Andrews. The first above the Great seam is called by him the middle or "Norris" coal, and the second the "Bayley's Run" coal. There are places where one of them appears to be wanting, but probably more thorough examinations will show that they are generally present. In section No. 1, taken principally from Mr. Nichols, the Bayley's run is not seen. They have been traced from the lower part of Sunday creek valley in Trimble,

up that stream and its branches, through the ridge into the valley of Moxahala; also, to the west into the valley of Snow fork, and to all the eastern branches of Monday creek. Their thickness varies from two to five feet, and the quality of the coal is not uniform, but is of the fat cementing or coking variety. Thus far the coke has not proven to be very solid, but under improved methods this difficulty can be overcome.

ELEVATIONS OF THE FIRST AND SECOND COAL SEAMS ABOVE THE GREAT SEAM.

	First Seam.		*Second Seam.*	
Locality.	Thickness. ft.in	Elevation. ft.	Thickness. feet.	Elevation. ft
Salt Lick, Perry county, Sec 33	2 3	42	2½ to 4½	70
Salt Lick, Perry county, Sec. 33, near center	2 2	50	4 7	80
Salt Lick, Perry county, Sec. 34	4 0	34	..	..
Salt Lick, Perry county, Sec 21	5 0	50	..	..
Salt Lick, Perry county, Sec. 23	4 0	40	..	..
Salt Lick, Perry county, near Straitsville	2	50	..	..
Salt Lick, Perry county, near Shawnee	2 0	40	4 0	70
Monroe tp., Perry county, Sec. 19	4 6	52	..	90
Pleasant tp., Perry county, Sec 10	..	35	..	..
Pleasant tp., Perry county, Sec. 30	4 0	30	..	..
Bristol, Perry county	thin	50	6 0	70
Ward tp., Hocking county, Sec. 6	..	35	..	75
Ward tp., Hocking county, Sec. 3	3 6	50	..	85

SECTION NO. 2—SHAWNEE.

The usual four beds of coal are found around Shawnee in their proper places, also a fifth higher up, not yet explored, lying a little below the Iron Point ore. Two furnaces are running on the Great Seam coal, and the upper or Shawnee ore. The two upper coal seams are bituminous and coking, but are not very uniform in thickness. Coke has been made from the Norris bed, and though not satisfactory, there are no doubt modes of making it which will secure better results. The flinty limestone below the lower coal is probably local, being rather too high for the "Putnam Hill" limestone.

Passing over a low summit on the east to the waters of Sunday creek, the blue limestone and three beds of coals may be traced down the valley of Hadley's Fork to Buckingham. Iron ore has been struck in several places in this valley. In constructing this section I have had the assistance of Captain Abbott, a civil and mining engineer residing at Shawnee. It does not reach up to the general level of the country. Beds of limestone and of ore exist higher in the hills, which are not yet developed.

SECTION NO. 3.

This and the last are a little less than three miles apart. It is partly a composite intended to represent all the reliable beds now uncovered, of which there are seven (7) of ore, five (5) of limestone and the entire group of coal seams. The same seams were shown in the profile heretofore published passing through Straitsville on the line of dip. Both the Bayley's run and the Norris coal have been opened on sections 33 and 34, but nowhere extensively mined. In the five mines around Straitsville the average thickness of the Great seam is ten (10) feet. Here it is near the bottom of the valleys, but rises rapidly to the west, so that on Monday creek it is well up to the tops of the hills.

As the beds rise in this direction the group of iron ores beneath the Great seam become more and more accessible. Ore No. 2 from the top of the section, is in the place of the great Shawnee or Iron Point seam, overlaid by the same yellow and dun colored shales. The limestone which caps the hills is probably the "Cambridge" lime rock of Professor Andrews, which generally has ore on the top of it. Between the Norris and the Bayley's run coal there is a bed of ore that has been found every where in its place, though it varies in thickness. In the country it has the name of the Sour Apple seam. The beds of lime rock between the Norris and the Great seams are not persistent, but appear to be local patches.

SECTION NO. 4.

This is made up by slight changes of out-crops from the profile of Mr. Nichols. It shows eleven (11) beds of ore, none of which are as yet fully wrought. Explorations are going on, on the eastern branches of Monday creek, Lost run, Sand run, and Poplar run, which indicate that there are several workable beds. All the seams of coal are present in their proper places. The main object in composing these four sections, taken at intervals along a line of 15 miles in length, is to show the *regularity of the series.* In No. 1, at Moxahala on the extreme north, the Bayley's run coal is not shown, but it will probably be found in further research.

I have marked its place on that section.

On this section the upper limestone is regarded as the Cambridge. No beds of lime rock are yet discovered below the Bayley's run coal. None of these sections go down to the Putnam Hill limestone, which is about (80) eighty feet below Great seam, but in none of them is the limestone wanting. If the Shawnee ore is here, its place should be about one hundred feet above the Great seam, coming in above the Bayley coal.

In all of these sections, and all other sections and profiles I have seen in this region, all the materials exist for making iron on the spot, and therefore at the lowest possible cost.

FORMATION OR ORIGIN OF COAL.

This is a purely theoretical question, very interesting, but of no practical bearing. Of late years geologists are so nearly unanimous in their belief that coal is of vegetable origin, that an opposite theory is certainly against authority, and therefore regarded as a scientific heresy.

But nothing can be regarded as science, until it reaches the form of a demonstration. Discussion, hypotheses, opinions or beliefs do not constitute science.

My views on this subject are of long standing, and published as early as 1839; but during the past twenty years I have published nothing and said very little on the subject, not because my convictions are changed, but because it is wholly a speculative question.

It would require a horse and cart to carry all the disquisitions that have been published in that period to sustain the vegetable theory, and there is little prospect of a diminution. I refer to it here for the following reasons:

No sooner had the bill authorizing a geological survey of 1869 become a law, than the present director of the survey appeared in person at Columbus to solicit for his place. He held a life long professorship in New York, but coveted the survey and its emoluments in addition. The Secretary of the State Board of Agriculture likewise held a good place, but likewise wanted more. A cabal or ring was organized to accomplish these objects. How much influence they exerted upon the Executive, I cannot say; but the result was that if his prerogatives had been placed in their hands, they could not have had matters more their own way. It tallies with all precedents that places obtained by such combinations, result, as in this case, in defiance of law and neglect of duty. I have it, on credible authority, that this virtuous ring considered it honorable and proper to use my opinions on the origin of coal, to my disadvantage, in their electioneering efforts around the State House, although I have published nothing on the subject for twenty years. I did not feel inclined to continue a discussion of no practical importance, neither am I disposed to change my convictions, merely for prudential reasons, and therefore now restate the objections I hold to the vegetable theory.

They are in short that *three physical impossibilities* must be overcome before it can be received. First—It is impossible to account for the requisite accumulation of vegetable matter, upon the hypothesis of peat bogs, for peat is never produced in tropical climates, and the vegetation of the coal strata is entirely tropical. Peat belongs wholly to high temperate or to low Arctic zones. It knows no geological horizon, but is a surface deposit in restricted local patches on rocks of all ages, and not itself older than the drift era. The peat and muck beds of that era, covered by the drift, have nowhere been transformed into coal.

This mode of supplying vegetation has recently been given up, and in its place we have that of tropical air growing ferns, palms and mosses, rooted in vast marshes of shallow salt water.

Secondly—No marshes of an extent equal to even the small coal fields exist upon this planet. It is neither philosophical or scientific to assume, without proof, that they have existed because a theory requires it. The largest of known marshes are at the deltas of great rivers, such as the Ganges, the Amazon and the Mississippi. None of these produce the vegetation of the carboniferous era. In none of them has coal been formed. In none has the plant growth arranged itself in layers or strata separate from the mud by which it is covered. The vegetation itself has only a limited portion of the chemical elements found in coal. Neither lime rock, iron ore, or sandstone which form the principal part of all coal fields, are formed in the delta deposits. Vegetation exposed to the air in hot climates perishes rapidly. It does not assume the form of preserved carbon. To accumulate and preserve vegetable carbon from such a growth requires conditions and chemical changes of which we have no examples in nature. It is not

impossible that solid deciduous or resinous trees may be more or less carbonized by deep burial in the earth, but the soft cellular watery tissue of tropical plants is quite a different thing.

Thirdly—If such extensive and shallow swamps existed, filled with a dense tropical vegetation, accumulated in such immense quantities, several hundred feet thick, without decay, and being entombed, were capable of furnishing the elements of coal, it is still necessary that for every stratum thus formed the land should sink regularly to such a depth that earthy sediments must form over it, and remain so for a period of great geological length. The land must then rise parallel to its first position, and having reached within a few feet the surface of the ocean, must cease to rise, and remain fixed there during another geological period. It must thus rise and descend as many times as there are layers of coal, each time with the same horizontal precision.

Before adopting an explanation surrounded by so many complications and incongruities, we should consider whether there are not modes of formation more in accordance with the simple and direct operations of nature, known to have been in operation in other rocks interstratified with coal. These are sandstone, shale, iron ore and limestone, which no one denies are sedimentary and chemical deposits from the ancient saline waters of the ocean.

It is not philosophical to take the coal beds interstratified with these rocks, out of the same category, until we are absolutely compelled to do so. The waters and the atmosphere of the carboniferous era embraced all the ingredients to form all these strata, and the only question to be solved is the *mode of separation* or segregation. These ingredients were carbon, sulphur, oxygen, phosphorous, hydrogen, silica, magnesia, alumina, iron and lime.

There is solid carbon in the form of graphite, and the carbonates of iron, magnesia and lime in the old rocks where there is no proof of vegetation, and like the coal beds immeasurably beyond the supply of all the vegetation, recent or remote, of which there is any proof. There are oxy-carbons and hydro-carbons, in formations more ancient than the coal or any known vegetation.

They had only to obey their chemical affinities to form, under known laws, all the beds of our coal series.

Cleveland, Ohio, June 1, 1877.